

**Thorndike's Laws of Learning
A Programmed Instruction in
Elementary Teacher Education**

Sadashiv S. Kahalekar

**Department of Teacher Education
N. C. E. R. T., New Delhi**

Department of Teacher Education
National Council of Educational Research and Training
12-C, Green Park Extension, New Delhi-16

**' THORNDIKE'S LAWS OF LEARNING '
A PROGRAMMED INSTRUCTION
IN
ELEMENTARY TEACHER EDUCATION**

Research Report

by

**Sadashiv S. Kahalekar,
B.Sc.M.Ed**

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GUIDANCE AND SUPERVISION

Dr. C.S. SUBBA RAO
M.A., M.Ed., Ph.D
Field Adviser,
Department of Teacher Education,
National Council of Educational
Research & Training,
12-C Green Park Extension,
New Delhi-16

**Orientation in the Technique of
Programmed Instruction,**
Courtesy of

DR. SHARAD S. KULKARNI
Psychometrician,
Department of Psychological Foundations
National Council of Educational Research
and Training, Mehrauli Road, New Delhi-16

FOREWORD

This study of preparation of programmed instruction is akin to the research studies of preparation of intelligence or other psychological tests; and even then different from them in certain respects.

Infact it is a beginning of the chain of experiments and research, to ascertain whether or not the modern technique of programming is helpful in fighting with our problems in the field.

I am really grateful to Dr. S.B. Adaval, Ex-Head of the Department, who not only allowed me to take over the venture, but encouraged by providing utmost facilities and opportunities.

I express my gratitudes to Dr. C.S. Subbarao who allowed me free-hand in the study, supervised and offered guidance with keen interest, critical judgement and never-ending-patience.

I consider myself most fortunate to have the rare opportunity of attending the Programmed Instruction Workshop, held under the auspices of the Department of Psychological Foundations, National Council of Educational Research & Training, where I could avail the able guidance of Dr. Susan Markle, consultant from U.S.A and other eminent participants of the workshop.

I express my gratitudes for the inspiration and orientation given by Dr. S.S. Kulkarni, Psychometrician, Department of Psychological Foundation, Secretary, Indian Association of Programmed Learning and the pioneer in the field of programming in India. This venture, though outcome of the inspirations taken from him, may be worth of an amaturish bravado, I hope will lead me to bright prospects in future.

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CHAPTER - I

PROGRAMMED INSTRUCTION IN ELEMENTARY TEACHER EDUCATION

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OUR avowal to universal, free and compulsory education necessitates huge number of quality teachers in elementary schools. Especially the quality of elementary teachers is going to determine the fate of our system of education.

The technique of programmed instruction, being a scientific method of accelerated learning when utilised in elementary teacher education can help to bring about quality teachers.

(1) Enrichment of Content-Knowledge in Continuation Education;

Academic qualification required of an elementary teacher is generally the secondary school examination pass, or even less than that. They are allowed to appear the higher examinations by the boards of secondary educations or the universities; but there is no provision for educating them for the higher examinations.

Naturally, many of them do not intend to undergo the ordeal. Those who appear to the examination in absence of proper preparation, many of them fail. Purfunctory studies from notes or guides may help a few of them get through. But that does not make any significant change in their quality.

Correspondance courses is one way of breaking the ice. Availability of suitable programmed instruction on the related subjects will assist them as well as motivate them for higher studies.

(2) Enrichment of Content in Teacher Education Programme:^{1/}

The larger portions of our training programmes is allotted for instruction in content matter. The modern changes in the subject matter, e.g. new mathematics etc., require the already trained teachers- even the teacher educators to be oriented in the new curriculum. Suitable programs prepared and used in elementary teacher training institutions will help remedial studies and enrichment of the content as well. The additional time thus saved may be utilised in intensifying professional education which badly requires it.

(3) Programmed Teaching:

Recent idea of programmed teaching is worth consideration. Instead of using programmed books or machines, the teachers are prepared for teaching in specific topics in a programmed way. They are enabled to present the matter in a logical sequence, small steps

^{1/} American spelling 'program' 'programmed' or 'programming' is used for programmed instruction. In other places, it is "programme"- English-as usual.

and all that. Exponents of this idea claim that the scarcity of subject matter specialists can be dispensed with by using programmed teaching. They trace the origin of this idea to the grand old "monitorial system" of ours.

(4) Programming Practices:

Programming, as it is based on the sound psychological principles, is more than a technique of preparing instructional material. It is a method of effective instructions. The practice of specifying objectives in behavioral terms - student's performance, proceeding with small steps, active responses from the students and mastery of each step before proceeding to the next higher step, and finally, evaluation on the basis of set criterions, all this process is essential to be incorporated in practice teaching, leading to effective results. In absence of any set dynamic method of teaching, good old Herbartian steps are still sovereign in the field.

The student teachers using programs for themselves, and a little orientation, will be able to initiate them in the programming practice. This is most essential need of the day, its implementation is also very easy.

(5) Programmed Learning in Professional Training:

Instruction in principles of education, educational psychology, methodology problems of education are the essential professional features in elementary teacher

education programme. The students undergoing the course have almost none of the background in the subjects. Their reaction towards these subjects is either as "hard nuts" or that of "too common sense verbiage" due to deficiency in instructional methods.

Programmed instructions prepared in some of the topics will help the student teachers in proper comprehension of the subject.

As there is scarcity of the programmed material in this field, present study is an attempt to prepare one on a topic in educational psychology, to be used by the student-teachers in elementary teacher institutions.

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CHAPTER - II

PLAN OF THE STUDY

I. Objectives:

- (1) It is intended to study what is the new technique of programmed instruction. In this connection, the socio-philosophical basis of programming, the psychological principles involved in programmed learning, types of programmed instructional material and their usage will be studied. A review of historical background and Indian efforts in the field of programming will be taken.
- (2) The role of programmed instruction in elementary teacher education is intended to be studied with reference to its need, areas and procedure.
- (3) The technique of preparation of program is to be studied with various phases and steps involved.
- (4) On the basis of these techniques, a program is to be prepared on "Thorndyke's Laws of Learning" to be used by the students in elementary teacher education institutions.

II. Title of the Study:

To Prepare and Develop a Programmed Instruction Aid on "Thorndyke's Laws of Learning" to be used by the Students in Elementary Teacher Education Institutions.

III. Definitions and Delimitations:

- (1) Preparation and Development: Preparation of a perfect program requires highly specialized expertise in

various fields, i.e., subject-matter, psychology, techniques of programming, editing, evaluation. In fact it is a work of a team of experts. Even then the work with limited competence and resources at disposal will have its own headway. In the domain of research, action research by a class-room teacher is of immense significance.

The program is to be prepared in consultation with and under the able guidance of experts in the various fields.

The development of the program involves various processes of try-outs, modifications and chain of elimination-addition and editing. This phase of study could not have been given full justice due to following limitations:

- 1) Little time available to devote full time concentrations to the work of a chain of try-outs-analysis-modification;
- ii) the language ability of the population; inability to the access of standard technical terminology and proper conveyance of concepts in their medium of instruction and their difficulty in responding to a program in English;
- iii) experimental control with respect to the homogeneity and attainment not possible due to unavailability and limited competence in the tools and techniques of intelligence and

achievement testing.

In respect of finalizing the program, the task remained unfinished and open-end, with a sincere desire to take it up again, finalize and experiment on its efficacy, after returning back to the work field.

(2) Programmed Instruction Aids

The nature of the program to be prepared is Skinnerian Linier single trade program, continuous frames with more of constructed type responses.

(3) Thorndyke's Laws of Learning

The laws of learning are included in the psychology curriculum of the elementary teacher education. A preliminary idea about stimulus response bond, trial and error learning, the three principle laws; the law of readiness, law of effect and law of exercise will be introduced. The subsidiary laws and the critical evaluation of Thorndyke's theory of learning is out of scope of the programme.

(4) The Population

The students of elementary teacher education institutions, with academic background of Secondary School examination passing with English as a subject, is the intended population.

IV. Procedure

(1) Study of Books: An extensive study of related books in the libraries of the Central Institutes of Education,

the Department of Psychological Foundations, the Department of Teacher Education and the USAID Columbia Group Library. The periodicals and News Letter of the Indian Association of Programmed Learning have to be studied for the preparation of the synopsis of "what is Programmed Instruction" and "Programmed Instruction in India".

(2) Workshop:

Attended the workshop on Programmed Learning as a observer participant held under the auspices of the Department of Psychological Foundations, N.C.E.R.T, in two sessions of three and two weeks respectively.

(3) The Process of Preparation - development of the program

The following steps were followed in preparing the program:

- i) Defining the specific objectives in behavioral terms.
- ii) Preparation of a criterion test.
- iii) Content analysis
- iv) Writing down the frames.
- v) Editing
- vi) Try-outs.

V. Related Studies:

The technique of programming is of a recent origin in India. The studies relating to programmed instruction, preparation of programs and the experiments in India are very few in number though significant.

A brochure "Teaching Machines" by Helen and Homer Kemfer is published by the Directorate of Extension Programmes for Secondary Education, Ministry of Education, Government of India.

A booklet "An Introduction to Programmed Instruction" by Dr. S.S. Kulkarni is published by the N.C.E.R.T. These are the earliest beginning of the studies on programming in India.

Since then, the workshops conducted by the Department of Psychological Foundations, N.C.E.R.T and other isolated attempts produced a number of programs. The Centre and the Regional branches of Indian Association of Programmed Learning have conducted a few experiments.

The programs so far produced in India mostly concern with the secondary classes and mainly in the subjects like mathematics and science. A few programs on health education and family planning are brought about by the Madras Branch of IAPL.

There is not a single program prepared as yet, as far as the information is available, in the field of elementary teacher education, and none dealing with teaching of a topic in educational psychology.

Hence, this one is the modest attempt in this direction with an urge to explore the field, though the element of success is still obscure.

CHAPTER - III

PROGRAMMED INSTRUCTION - AN INTRODUCTION

The term "programmed instruction" refers to a revolutionary new development in educational technology that has been gathering momentum during the last decade. This new development is based on principles of learning theory that derive from modern experimental psychology. Its foundations lies in control over the interaction between the learner and the material to be learnt.

The general process of instruction in programmed learning consists of the cycle of the following steps:

- i) The learner reads a small unit of instructional material which includes invariably a question or other type of stimuli to which the learner has to respond.
- ii) He makes a response by carrying out the instruction, filling in the blank, making a selection from multiple choice, answering yes or no, completing diagram etc.
- iii) He is shown the correct answer.

II. The History of Programmed Instruction

Although the principles underlying the programmed instruction can be traced back to ancient greece and societal method of tutorial method, or the catachetical methods of Upanishads, modern developments may be said to

date from the work of Dr. S.L. Pressey of Ohio University in the early 1920's. In 1926, Dr. Pressey developed a testing device that is considered as the forerunner of present day efforts in the automations of education. Unfortunately, Dr. Pressey's early work met with little public support.

The educational technique was virtually forgotten until 1954, when a resurgence of interest was initiated by the work of Prof. B.F. Skinner and his associates in psychological laboratories of Harvard University. Since then, programmed instruction has received broad recognition and support. Numerous educational, military, and industrial organisations in U.S.A have undertaken pilot programs to test the effectiveness of the new method, and various commercial ventures have been directed to development and marketing of vocational and academic programs of instructions and many types of automatic teaching devices.

III Characteristics of Programmed Learning

(1) Individualized Learning:

In programmed learning, each student can work each step as slowly or as quickly as he chooses. The principle in which the student is allowed to learn at his own rate is known as the principle of self-pacing. This feature of programming distinguishes it from the common class-room teaching, and other audio-visual aids wherein the instruction

is directed towards the average learner - a non-existent entity. One person learning at a time without any intermediary, a tutor or monitor, at his own pace leads programmed instruction to individualization of learning.

(2) Learning by Minimum Increments:

One of the important concept involved in programmed instruction is the idea that any educational subject matter can be analysed into a large number of very small steps representing increments of successive approximation to final mastery of the subject.

Thus the program consists of many number of easy to learn small steps, rigourously arranged in a logical sequence.

(3) Learning Through Active Response:

Student learns best when he is actively responding as he is learning. Successful learning means some way to regulate and sequence his activity so that we help him to learn more efficiently than he could do through other school room practices, wherein he is not required to respond actively to each and every step of instruction.

Each step in a program requires some kind of registration of response from the student.

(4) Immediate Confirmation of the Responses:

The student's answer is almost instantaneously checked against the correct answer, which appears before the next question is asked. In this way, student receives

the reassurance that his response is correct, and the very appearance of the correct response reinforces his learning. If the answer is incorrect, he can easily locate the reason for it.

(5) Student Orientation

The students - the actual consumers of the program - determine the nature of the program, unlike the usual text books. The text books are successively tried out and modified on the basis of students' responses. Essential step in the construction of programs is that they are to be tried out, and the various steps are to be modified, corrected and added to on the basis of the responses from the students.

IV Major Approaches in Programming

There are two major styles or systems of programming. The linear programming is associated with the work of Dr. B.G. Skinner and his associates of Harvard University. The intrinsic programming is associated with the name of Mr. Norman Growder, of Western Design Inc., in Santa Barbara, California.

(1) Linear Programming:

The linear or single track programs are designed to lead a student through the material in an unbroken sequence of steps. Linear programmers believe that errors inhibit or are aversive to learning.

By making each step in the learning process sufficiently small, by using prompts and by basing each small increment of learning on previously learnt material, they reduce the chance that the student will fail to grasp the information correctly. Therefore, they reduce the chance the chance that student's response will be incorrect. Usually they make use of constructed type of responses.

(2) Intrinsic Programming:

The Intrinsic or Branching programs generally are in the form of a "scrambled book". They do not ask for constructed responses, small steps, or the practising mostly of correct responses. Student is given a considerable amount of exposition, and requires relatively few answers. More information is provided per frame. Answers are to multiple-choice questions, a student has to discriminate and choose the one right answer which is presented along with a number of other plausible but incorrect answers. Learners who make the wrong choice from among those presented are asked to follow another track or branch which corrects their errors or further clarifies the point in question. The branching sequence may continue for a number of frames, again depending on the student's responses, before he finds himself on the main track.

V. Presentation of a Program

Programs of instruction are most commonly presented to the learner either in book format or in one of several other formats are appropriate for use with teaching machines.

Book-format programs are prepared either in printed-and-bound form, or in the form of miniographed work sheets.

Programs for machine presentation are prepared in film form for projection or printed on paper rolls or tapes or sheets for direct reading. Several very complex machines include the program as an integral part of device; the presentation and sequence of the program is controlled by changes in the state of electrical circuitry or mechanical components.

The physical arrangement of the instructional material within each program is accomplished in several ways. Typical arrangements present the instructional items in numerical order, with the answer to each question provided beside it or on the following page.

Depending on the particular book-form or machine program that is used, the teachers' response can be made directly on the presentation medium itself, on an answer-book or answer-tape that is provided separately; or by means of input control provided for response purposes.

With book format programs, a means is usually included for the learner to mark the answer to each question until after he has made his own response. With machine programs, marking of the correct answers is accomplished by the device itself; the exposure of each answer is either automatic immediately after the learner's response or is under the mechanical control of the learner.

In general all types of teaching machines incorporate the following characteristics:

- a) A program of instruction is exposed, one frame at a time to a learner, who must respond in some way to each frame before the program is advanced to the next one.
- b) After each response by the learner, the machine exposes the correct answer.
- c) The pace of exposure of the instructional item is controlled by the learner; no teacher need to be present.

It is evident that, in general, the teaching machine merely serves a convenient means for the presentation of the programmed instruction with the following distinguishing features:

- i) automatic control over the presentation, thereby prevents cheating;
- ii) elimination of complicated instructions;
- iii) provision for the recording and scoring the learner's behaviour;

- iv) aid in maintaining learner's interests because of its "hard-wave" characteristics.

VI. Philosophical Implications of Programming.

Exponents of programmed learning claim that there are several basic philosophical implications of democratic educational system to which programmed instruction lends support:

i) The ideal learning situation is that in which all pupils should be actively and continually involved. Normal class room practices do not provide such opportunity, but it is an essential ingredient of programmed instruction. The new technique of programming is pupil-oriented, but it is the pupil who must be stimulated to acquire information and ideas and make creative use of them.

ii) It is desirable that optimum provision to be made for individual differences. Programming provides for self-pacing of each individual learner.

iii) Involvement of the individual in making the final decisions is of immense value in democracy. The programmed material is an outcome of the responses of the learners. The grounds for modifications and alteration in the program are the errors committed by the learners.

iv) Each learner is provided an opportunity to learn on the guide-lines of the best master-minds, which

in case otherwise would not be possible.

v) Indirectly, programmed learning provides the opportunity of developing the discipline of logical thinking and self evaluation. It stimulates the students with the experience of maximum success.

VII. Psychological Foundations of Programming.

The technique of programming is an outcome of various experiments by Prof. B.F. Skinner and his associates in the psychological laboratories of Harvard University. Skinners theory of programming was based on operant conditioning and the principle of "reinforcement"- providing a reward for desired behaviour so that the behaviour tends to re-occur.

Desired learning is automatically "reinforced" with programmed instruction by immediate confirmation of each correct response that the learner makes. The learner's self-awareness of successfully responding is inherently rewarding. Programmed instruction structures the learning situation so that the learner is able to progress with minimum errors from one learning step to the next.

The learner's knowledge of his capability to progress successfully is another source of reinforcement and, thereby, serves to enhance the effectiveness of the learning process.

Prof. B.G. Skinner and Gibert have summerized those principles of learning which have led a number of workers to consider seriously the development of automatic teaching devices for use in the class-room. (W.J. Carr, A review of the literature on certain aspects of automated instruction pp. 58-60).

1. Learning takes place most rapidly if the student is actively engaged in subject matter.
2. Learning is most effective if the student develops the skills and knowledge in a form which will readily generalize to "real life" situation for which they are intended.

This means that the student must learn to construct correct answers to questions rather than merely be able to recognise them

3. Learning takes place most rapidly if immediate 'knowledge of results' is given for each response.
4. Learning takes place most rapidly if the subject matter is organised in a hierarchic form.
5. Receiving frequent 'knowledge of results' keeps student working at the assigned task.
6. Since learning takes place in individual, the learning situation should be designed so that each student may proceed at his own pace.

CHAPTER - IV

TECHNIQUE OF PROGRAMMING

Fundamental difference between the text-book lesson and a program is that the program has a question answer format which the text-book type lesson does not have. The responses of the students at every step enable the program to be revised and modified according to the mistakes committed. This characteristic of programmed instruction differentiates the technique of developing program from that of the text-book lesson.

There are slight differences in the constructions and development of various styles of programs. The steps of development of programs in linear or single track program are as following:

1. Enlisting Objectives or Terminal Behaviour

Behaviour refers to any visible activity displayed by a learner. Terminal behaviour means the behaviour which the learner is expected to be able to demonstrate at the end of the influence of programme.

An instructional objective describes an intended outcome rather than a discription or summary of content. One characteristic of a usefully stated objective is that it is stated in behavioral or performance terms that describes what the learner will be DOING when demonstrating his achievement of the objective.

Thus the following steps are involved in preparing instructional objectives for the programme:

1. Identify the terminal behaviour by name, which can be accepted as evidence that the learner has achieved the objectives.
2. Try to further define the desired behaviour by describing the important conditions under which the behaviour will be expected to occur.
3. Specify the criteria of acceptable performance by describing how well the learner must perform to be considered acceptable. ^{1/}

Specification of terminal behaviour means that the programmer must outline precisely the behaviour he wants the student to perform at the end of the program and must specify the kinds of stimulus material that the student will have available in course of performance. A concrete attack on the behavioral specification of educational aims is needed.

2. Preparation of a Criterion Test

The second important step in construction a program is preparation of a criterion test on the basis

^{1/}

Mager, Robert F. Preparing Objective for Programmed Instruction 1962 Fearson Publication, San Fransico, Chapter II & VI

of specific terminal behaviour. Short answer type or multiple choice questions are prepared for the objective assessment of the students' achievement working on the program.

A similar type of test is prepared to be administered as a pre-test before the taking of the program. This pre-test ensures the entering behaviour of the student. On the basis of the responses to the pre-test it can be decided whether the student has got the level of minimum entering behaviour required or whether he is already conversant in the terminal behaviour which is expected of him after he has worked on the program, and thereby it becomes superfluous. The pre-test consists of both the items:

- i) which test the required previous repertoire, and
- ii) which examine whether or not he already knows what is being taught to him.

The criterion test provides direction to the material to be incorporated in the program.

3. Task Analysis

On the basis of the terminal behaviour and the criterion test, the subject matter is analysed so as to organise components in logical order. A flow chart is prepared with pre-requisite skills and information i.e.,

entering behaviour, at the base line. Progressive steps involved are arranged in sequence to the level of terminal behaviour.

The flow-chart shows interrelation between the steps, their order of presentation and sequence of the logical incidence.

This task analysis flow chart is the blue print of the program to be prepared.

4. Writing the Draft-Frames

On the basis of the flow chart, the frames are written in a sequence. A "frame" is a single item in a program exposed at a time in the form of a question or statement to which the student is to respond.

Types of Frames:

There are various ways of classifying frames:

- 1) Lead in items do not require new information, nor do they require rehearsal of old skills. Their function is simply to orient the student to a problem and prepare him for new information.
- 2) Augmenting items supply new information but do not require the student to make a relevant response. If a response is required, it is designed to ensure that the student has read an item.
- 3) Interlocking items require a student to review established skills while new information is being presented.

- 4) Rote-review items present a problem identical to one presented earlier. They are not especially recommended, except in cases where the memorization of brief verbal material is desired.
- 5) Restate review items require a rehearsal of the skill where a problem is restated.
- 6) Delayed-review items allow for the distribution of practice. They differ from other items only in time of presentation.
- 7) Fading items require the student to review what has been presented; in addition they withdraw information successively.
- 8) Generalizing items present a verbal statement pointing to a common characteristic of several specific problems already presented to the student.
- 9) Specifying items exemplify general rule or principle.
10. Dovetailing items require the student to make separate responses to separate stimuli that might otherwise become confused. ^{1/}

^{1/} Gilbert's classification, abstract from
Dr. Kulkarni S.S.
An introduction to programmed instruction,
N.C.E.R.T. P.P. 13-14

Techniques involved in Frame Making:

(1) Prompting:

Prompt is some type of verbal or symbolic one which facilitates the desired response from the subject. Prompting concerns making the desired behaviour more probable. A major concern of programming is with techniques for getting the student to emit new or low-strength responses with a minimum of errors.

The occurrence of behaviour in a program is made more probable if the materials are designed so that each step makes the correct answer in the next step more likely. The probability of success is increased by the use of hinting and coaching techniques based upon what is known about the student's past behaviour.

The prompts leading to copying, and the format prompts are considered as inferior types of prompts. Overprompting is also not advisable. The thematic prompts which involve students' mental manipulation are considered best types of prompts.

(2) RULEG System

(RUL)

The subject matter is divided in certain rules (E G) and examples of these rules. Some of the programmes advocate the RULEG technique where the combinations of RULs and EGs are used, different at different stages of program. Elaborate type of matrix is also prepared for the use of RULEG, to be used in successive frames.

(3) Vanishing:

Fading or vanishing involves the gradual removal of prompts, so that by the time student completed the unit, he is responding to the stimulus material, which he will actually have available when he performs the "real" task. Thus vanishing frame involves gradual withdrawal of the stimulus support so that the student must more and more rely on himself to perform the criterion behaviour specified as the objective of instruction.

(4) Practice and Review:

Review and repetition frames are necessary to maintain previous learning and already-learned concepts which need be strengthened and utilized in further learning. Sufficient practice and over learning is necessary so that early material is thoroughly mastered before or while new material is introduced.

5. Editing

The draft frames arranged in the sequence of a program are edited with respect to the following:

- a- Subject matter consistency and adequacy
- b- Style of writing
- c- programming technique

Following technical defects are identified and removed:

(1) Implied Discrimination:

Implied discrimination indicates that two or more concepts, chains, or discriminations covered in the program

have elements involving generalization and discrimination, and that one of those concepts, chains or discriminations is being taught independently of others.

The revision of the defect "implied-discrimination" can be made by teaching both/more concepts or chains in the same frame rather than in frames removed from one another.

(2) Too early Technical Term:

When the technical term first appears where it is behaviorally significant prior to the student is able to produce and identify examples or give the definition of the term, the defect is edited as "too early technical term".

(3) Non Critical Art-work:

When an art-work, (figures, pictures etc.) if deleted from the frame, would not affect the student's ability to respond correctly is known as the defect of non critical art-work.

The art-work is either deleted or made critical by adding items as appropriate to the sequence.

(4) Non Critical Verbige:

The verbige which if deleted from the frame would not affect the students ability to respond correctly is 'non-critical' verbige defect.

In general verbige should be kept to the minimum required to establish responses contained in the terminal behaviour specifications.

(5) No Prior Strengthening:

No prior strengthening indicates that the response has received no strengthening in previous frames, or does not appear in previous frames at all.

The defect is removed by inserting new frame to precede this frame.

(6) Tryout and Revision:

After editing, the draft program is administered to a small group of students, from the intended population. Mistakes committed by students while going through a programme and their achievement on a criterion test may suggest various attention to be made in that program. Addition of the frames where the students find difficulty and the deletion of superfluous frames, which cause boredom leads to modifications of the program.

The try-out and revision procedures are to be repeated until the desired behaviour or test results are produced reliably and efficiently by the program.

(7) Validation and Evaluation:

After a program is revised on the basis of the try-out data, it needs to be administered to a representative sample from the intended population of students. An increased level of achievement on the criterion test by the students will demonstrate that the program works.

CHAPTER - V

A PROGRAM ON THORNDIKE'S LAWS OF LEARNING

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I. Terminal Behaviour

After undergoing the program, the students will be able to

- (1) enumerate the three major laws of learning, i.e., the law of readiness, the law of exercise and the law of effect;
- (2) designate the law when an illustration involving it is given;
- (3) give an illustration of the laws;
- (4) give the name of the law when the statement of the law in terms of stimulus and response is given.

2. Entering Behaviour

Before going through the program the students should be able to:

- (1) describe the meaning of learning, in his own sentences that nearly means "change in behaviour".
- (2) give the instances of the terms "behaviour", "environment", "satisfaction", "annoyance".

The task analysis and the criterion test are given at the end of the program.

3. Instruction for Working on the program.

This program is designed to guide you through the subject in a careful sequence of steps which makes for efficient learning. Each step is called a frame, and each frame brings in something new. It also asks you to use this new material - which is based on what you have already learned - in an active response. This means that you will be asked to complete a sentence, fill in a blank, check a multiple choice question, or make some other brief response.

It is best to make your response in the space provided in the frame itself.

After you have made your response, you can check your answer with the correct answer, which is next to each frame. Thus you will master the material step-by-step fashion, responding each step, and checking each answer you write.

The frames of the program which contain the material to study and the questions to answer, are on left side of each page, and are numbered in a serial order. The answer to each frame is just to its right.

Does it matter if you peek at the answer before you try your own? Yes, it does - you will not learn as well. You will get most frames, and if you write

your answer to each one, you will learn well. Many students find it helpful to cover the answer with an index card, which you can slide down the answer column as you progress through the frames.

You will probably make an occasional error. When this happens, check the answer given and satisfy that you understand it.

Remember: You will learn in steps, respond to each step, and check your answer right away - after your response. This is not a test, and there are no trick questions. After mastering this program in the proper manner, you will understand some important principles of psychology.

4. THE PROGRAM

PART I. STIMULUS, RESPONSE AND STIMULUS RESPONSE BOND

- 1 -

Things happen in our environment, e.g.

a- A piece of sugar-ball is placed
on the tongue

b- A light is shined in the eye

These things that happen affect our
behaviour in certain ways, e.g.

c- Our mouth is watered

d- pupil of the eye becomes smaller

The placing of sugar-ball in the mouth
probably is followed by

() watering of the mouth

() decrease in the size of the pupil

Shining a light in the eye is followed by

() watering of the mouth

() decrease in the size of the pupil

Watering of
the mouth

decrease in
the size of
pupils.

- 2 -

An event in the environment is called
STIMULUS (plural STIMULI)

Parts of our behaviour is called RESPONSE.

The increase of room temperature is

() Stimulus

() Response

This leads to perspiring, which is a

() Stimulus

() Response

stimulus

response

- 3 -

Which is the stimulus?

() Cold wind

() Weeping

Which is the response?

Cold wind

() shivering

() Onion placed under the nose

shivering

- 4 -

We are interested when stimuli and responses are related in some way.

Check the sentence that seems to express a relationship between stimulus and response.

(a) As he walked down the hill,
a cool wind began to
blow.

(b) As the cool wind blew, he
began to shiver

(b)

- 5 -

Check the appropriate response related to the following stimulus:

<u>Stimulus</u>	<u>Response</u>	
A piece of suger on the tongue.	() weeping	
	() pupil contraction	
	() watering of the mouth	watering of the mouth
An onion under the nose	() weeping	
	() pupil contraction	weeping
	() watering of the mouth	

- :: 34 ::-

- 6 -

Check the stimulus that is related
with the following response:

<u>Response</u>	<u>Stimulus</u>
Heart rate increase	() a piece of suger
	() an electric shock
	() cold wind
	() a piece of sugar
	() an electric shock
	() cold wind

- 7 -

The relationship between the stimulus
and the response is called STIMULUS-
RESPONSE BOND or S-R Bond e.g.

If light shines in your eye,
the pupils contract

In this S-R Bond,

Stimulus is the
and the related
Response is

shining of
light in
the eye

contractio
of pupil

- 8 -

In a S-R bond, stimulus is related with response.

What will be the probable S-R bonds from the following stimuli and responses?

<u>Stimuli</u>	<u>Responses</u>
a) Increase in the room temperature	d) increase in the heart rate
b) An electric shock	e) vomiting
c) A rotten odour	f) perspiring
(a) - ()	a-f
(b) - ()	b-d
(c) - ()	c-e

- 9 -

In a S-R bond, a specific stimulus is related or connected with its own particular

Response

-10-

In a S-R bond, a stimulus is _____ with a response.

connected

- 11 -

Does any stimulus and any response
from a stimulus response bond?

() Yes

() No

no

- 12 -

Only when a stimulus is connected with
a response, we speak of _____

S-R Bond

- 13 -

The connection can be shown with
the sign -

Thus a stimulus response bond can
be shown as

S () R

S - R

- 14 -

In a stimulus response bond, which
comes first in time?

() Response

() Stimulus

Stimulus

-: 37 :-

-: 15 :-

In S - R

() is folloed by ()

() comes after ()

S followed by

R comes
after S

- 16 -

We have used the word stimuli to
describe parts of, or arrange in
parts of

() behaviour

() the environment

the environment

- 17 -

Cold wind is a part of

() behaviour

() the environment

the environment

Therefore we can call it as a _____

stimulus

Steady light is called a stimulus because it is

- | | | |
|-----|---------------------------------|---------------------|
| () | a part of environment | part of environment |
| () | a change in part of environment | |

A sudden flash in a steady light is called a stimulus because it is

- | | | |
|-----|---------------------------------|------------------------|
| () | a part of environment | a change in
part of |
| () | a change in part of environment | environment |

A soft sound becoming loud can be called a stimulus because it is

- | | | |
|-----|---------------------------------|---------------------------------------|
| () | a part of environment | |
| () | a change in part of environment | a change in
part of
environment |

A part, or change in a part of environment
is called a stimulus.

In like manner, a part, or a change in a part of behaviour must be definition of

STIMULUS

- 21 -

Stimulus response bond can be shown
in a diagram as

S - R

() - ()

- 22 -

It is only when the stimulus and the
response are _____,
we call it as S - R

connected

- 23 -

A part, or a change in a part of
environment is known as _____

stimulus

A part, or a change in a part of
behaviour is known as _____

Response

- 24 -

The relation or connection between the
stimulus and response is known
as _____

S-R Bond or
stimulus
Responding
Bond

It is diagrammatically represented as

S - R

PART II

LEARNING

- 1 -

We define stimulus as part or change
in part of

() behaviour

() environment,

environment

and the definition of Response is that
it the part or change in part of

() behaviour

() environment

behaviour

- 2 -

When a stimulus is connected with
a response, we call it as _____

S - R Bond

- 3 -

When a steady light is shown in your
eye, you may either put your hand
across the light, or face it with
a smile, or close your eyes, or
frown at it.

What is the stimulus here?

shining of
steady light.

What are the possible responses to the
stimulus as shown here?

- | | | | |
|-----|-------|-----|------------------------------------|
| (1) | _____ | (1) | putting the hand accross the light |
| (2) | _____ | (2) | facing it with a smile |
| (3) | _____ | (3) | closing the eye |
| (4) | _____ | (4) | frowning |

- 4 -

A particular stimulus may evoke many number of responses.

A round red object is shown to you. There may be various possible responses from you to this object; you may smell it, throw it, keep it in your pocket, or return it back.

How many responses are shown here evoked by the stimulus?

four

- 5 -

There is one stimulus S, which can evoke five responses R₁, R₂, R₃, R₄ and R₅.

How many S-R Bonds are possible to be established?

five

How the diagrams of the possible S-R Bonds

S - ()	S - ()	_____	S - R ₁
			S - R ₂
			S - R ₃
			S - R ₄
			S - R ₅

- 6 -

If R_3 response is selected from five of the responses, and connect it with S_4 , the SR Bond can be written as

$S - R_3$

It means that whenever S_4 stimulus occurs, the response _____ is committed.

R_3

- 7 -

If a symbol, '7' is shown to a child, and his response to it is saying five "at one time," "ten" at another and "seven" at still another time.

Will you say that the SR bond is established between stimulus of symbol "7" and the response of saying "seven"?

() yes

() no

no

- 8 -

If a child always responds "ten" when he is exposed to the stimulus "what is '7'?"

Will you say that the SR bond is established between the stimulus of "what is '7'?" and the response "ten"?

() yes

() No

Yes

- 9 -

When a particular response is related from among other responses and connected with a stimulus to form SR bond, we say that the response is learnt.

This way of learning is known as learning by SELECTION and _____

connection

- 10 -

THORNDIKE says that we learn by selecting and connecting.

It means that we learn when select one _____ from all others and connect it with the _____

Response

Stimulus

- 11-

After the connection of a stimulus with the response, SR bond is formed; we say that the response is _____ by the method of _____ and _____

learned
selection and
connection

- 12 -

When the response is learned, it will occur whenever the _____ appears.

stimulus

- 13 -

When a question is asked "what is the capital of Maharashtra State?" the student always responds "Bombay", we say that the SR bond established or the child has learnt the _____ with respect to _____

Response
stimulus

- 14 -

Thorndike says that we learn by the method of _____ and _____

selection
connected

- 15 -

In learning we select _____ and connect it with _____ that is, a bond is formed between _____

response
stimulus

stimulus and
response

- 16 -

The theory of learning by selection and connection is propounded by _____

Thorndike

- 17 -

Learning occurs when _____ is _____ and _____ with _____ to form _____ bond.

- response
- selected
- connected
- stimulus
- S R

A boy learns to say "seven" when he is asked about the symbol "7", and not to say "v" any other number.

Here the stimulus is _____
response is to say _____
which is selected from _____
and connected with the _____

symbol 7
"seven"
all other
responses
stimulus

This theory is also known as
CONNECTIONIST Theory of learning

Why it should have been named
so?

(in your own
words)
because it
implies
connections
between S & R

Connectionist theory of learning is
also known as theory of learning
by _____ and _____
which is propounded by _____

- selection &
connection
- Thorndike

Stimulus is part of or change in part
of _____
Response is _____

the environment
behaviour

Connections of stimulus and response is
known as _____

SR bond

It is diagrammatically shown as _____

S - R
(in your own
words) the
definition of
learning as
selection of
R and connection
with S.

PART - III

LAW OF LEARNING

- 1 -

Learning is _____ of a response
and _____ it with the
stimulus

selecting
connecting

- 2 -

How the selection is made and the
connection is established between
the stimulus and response? Answer
to this question is given by
certain laws. These laws are known
as the laws of _____

learning

- 3 -

Response is part of _____

behaviour

If you refuse to behave, will
there be any response?

() yes

() no

no

- 4 -

If we refuse to respond, or not
ready to do so towards certain
stimulus, learning

() does take place

() is not possible

is not
possible

of trials, the total time required by the cat to get out decreased.

Eventually the cat learned to escape immediately without random activity.

- 8 -

Read the panel carefully and answer the following question:

What were the different responses of the cat in the cage?

clawing, biting,
dashing, hitting
touching the
release

- 9 -

What response was selected by the cat finally to escape from the cage?

touching the
release.

- 10 -

If the cat feels comfortable in the cage and does not want to escape out, will it be able to select the response of touching the release?

() yes

() no

no

(in your own words)

no ready to do so.

- 11 -

The cat satisfied to be in cage
will not learn the escape mechanism.
This is an example of the law
of _____.

- 12 -

Response of saying "Seven" is repeated
several times for the stimulus "what
is '7'?" by the beginner in number work.
He repeats "eight" for the symbol "8"
only once or twice.

In what case the stimulus response
bond will be stronger?

() "7" - "Seven"

"7" - "Seven"

() "8" - "eight"

- 13 -

Repetition of the response to the
stimulus strengthens _____

S-R Bond

- 14 -

Second law of learning states that the
repetition or exercise makes the SR Bond
_____ and the learning more
permanent, therefore this law is called
LAW OF EXERCISE

Stronger

- 15 -

If you pass through a certain street in a new city many times, you will "Learn" the street more permanently. This is an example of the law of _____

exercise

- 16 -

Write down the name of the two laws of learning:

1. The law of _____
2. The law of _____

- 17 -

Refer the panel again and read it carefully.

Answer the following question:

What happens when the cat touches the latch or button?

The cage door opens and the cat escapes out

- 18 -

Will the cat learn pushing of the latch or button, if the cage does not open by pushing it?

- () yes
- () no

no

- 11 51 :-

- 19 -

If the mechanism is so arranged that the cage opens when the cat dashes against a certain bar.

What response then the cat would be learning?

Why?

dashing against
the bar
(in your words)
it can escape

- 20 -

Cat does not feel comfortable in cage, therefore it will try to learn whatever mechanism which

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releases it from
the cage

- 21 -

Response is learnt which ultimately provides satisfaction.

What satisfaction does the cat get by learning to push the latch?

(in your words)
it is released
from the cage

- 22 -

If the mechanism is so arranged that whenever the cat touches the buttons, it will get a blow on the head, or a mild electric shock.

Will the cat learn to push the button?

() yes () no

Why?

no
(in your words)
The cat gets
dissatisfied or
annoyed.

- 11 52 :-

- 23 -

Satisfaction helps establishing the SR bond,
where as annoyance does not help it.

What will help in learning the response?

() Reward

Reward

() Punishment

- 24 -

The effect of the result of the response will
determine whether the _____ will be
established or not. This is the third law of
Learnings LAW OF EFFECT

S.R. Bond

- 25 -

" The behaviour which is rewarded is
easily learnt " is shown by the law
of _____

effect

- 26 -

If you are not prepared do a certain
thing, you will not learn it.

Law of reading

What law is involved in it?

- 27 -

You try to memorize various dates which mean nothing to you, you are not able to learn them.

Name the law which explains it. _____

Law of effect

- 28 -

If a child reads a poem various times, he can reproduce it well when asked.

Name the law involved in it

Law of exercise

- 29 -

"you can drive the horse to water, but it is the horse that drinks it" implies the law of _____

Readiness

- 30 -

Stimulus-response bond is strengthened when it is repeated many a times.

Law of _____

exercise

- 54 -

- 31 -

Stimulus response bond is strengthened when it leads to satisfaction and is weakened when it leads to annoyance.

Law of _____

effect

- 32 -

When one is not prepared to respond, imposing him to do it will not help the learning of the response

Law of _____

readiness

- 33 -

Matter, which is not meaningful to the student, is not easily learnt.

Law of _____

effect

- 34 -

Praise, approval, reward helps learning.

Law of _____

effect

Boy is unable to learn riding the bicycle.
Write down the probable causes, concerning
each of the three laws against them:

<u>Law</u>	<u>Causes</u>
A. Law of readiness	The by may not be _____ _____
B. _____	_____ _____ free response _____
C. _____	_____ _____

Law of effect states that _____

Law of exercise state that _____

definitions

Law of readiness states that _____

5. Criterion Test

1. stimulus is the part or change in law of _____
Response is the part or change in part of _____
2. Connection between stimulus and response is known as _____ and digramatically represented as _____.
3. According two Thorndike, learning is a process of _____ a response from other responses and _____ with the stimulus, therefore this theory of learning is known as _____.
4. State the names of three laws of learning
 - Law of _____
 - Law of _____
 - Law of _____State the Law which is meant by the following sentences:
 5. " The more times a stimulus induced response is repeated, longer it will be retained."
Law of _____
 6. A response is strengthened if it is followed satisfaction and weakened if followed by annoyance
 - Law of _____
 7. " For a conduction unit ready to conduct, to do is satisfying and not to do is annoying."
Law of _____

Give examples in brief of each of the laws:

8. Law of readiness

e.g. _____

9. Law of exercise

e.g. _____

10. Law of effect

e.g. _____

Congratulations?

You have answered all the questions correctly.
Because you have mastered this topic.

(Have I used the 'law of effect'?)

6. TASK ANALYSIS

Thorndike's

Laws of Learning

Law of readiness

Law of exercise

Law of effect

Name the law
when statement
is given

Name the law
when illustration
is given

Give the illustrat-
ion when the name
of the law is
given.

Learning by Selections and
Connections

Stimulus - Response Bond

Stimulus

Response

- Definition

Definition

- Illustration

Illustration

Environment

Behaviour

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